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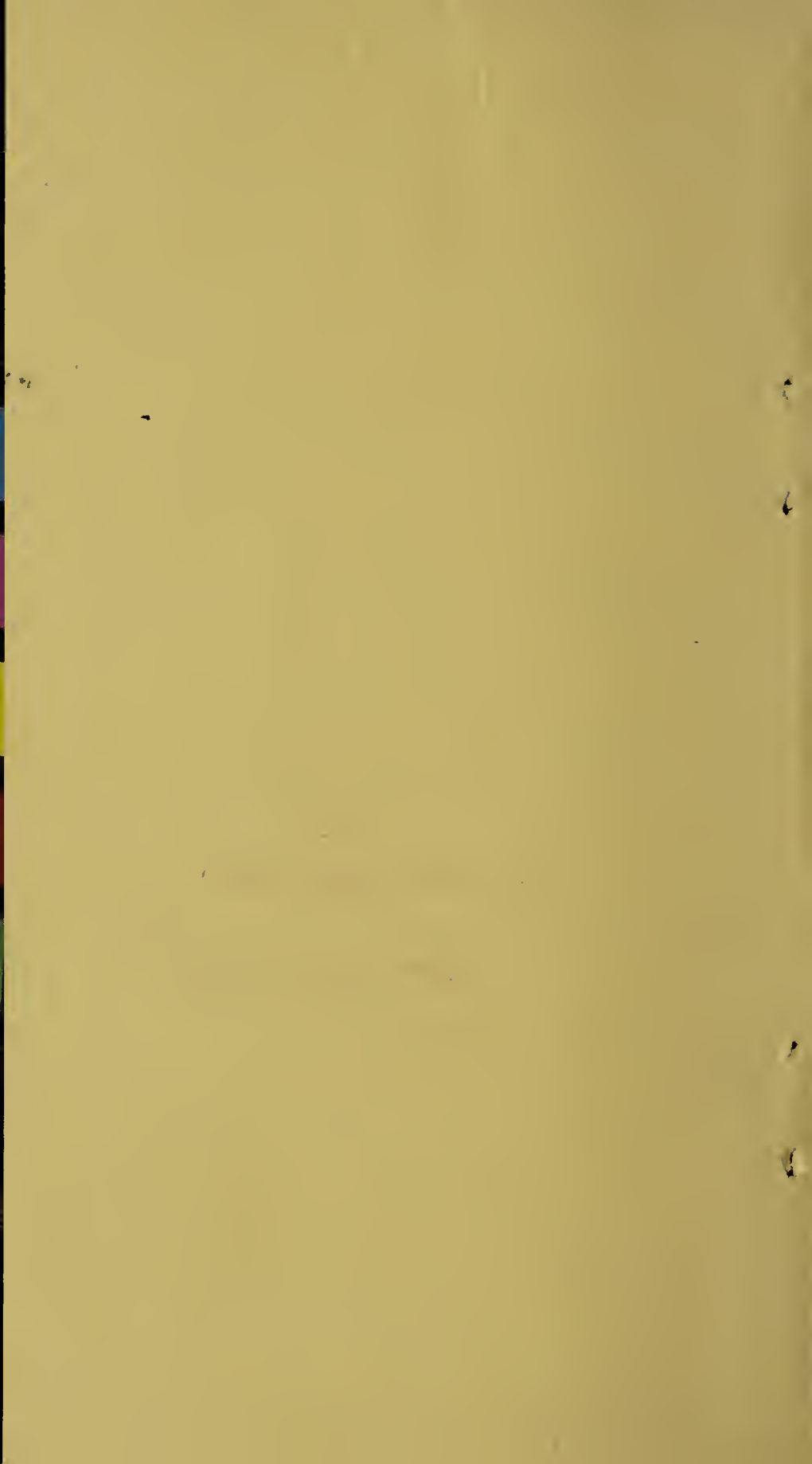
**UNITED STATES
DEPARTMENT OF AGRICULTURE
Bureau of Agricultural Economics**

**HANDBOOK
OF
UNITED STATES
STANDARDS
FOR
SOYBEANS**

EFFECTIVE SEPTEMBER 1, 1926



**UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON**



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U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF AGRICULTURAL ECONOMICS.

The following standards for use in the grading and marketing of soybeans are recommended by the Bureau of Agricultural Economics, United States Department of Agriculture. These standards are the result of studies and investigations of all phases of the soybean industry and of suggestions received from persons experienced in the production, marketing, and grading of this commodity. Their adoption and use by all agencies engaged in handling soybeans should promote uniform grading and should facilitate the marketing of this commodity.

C. W. KITCHEN,
Acting Chief of Bureau.

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U. S. STANDARDS FOR SOYBEANS

DEFINITIONS

For the purposes of the U. S. Standards for Soybeans—

Soybeans shall be dry threshed beans of any variety of soybeans which contain not to exceed 25 per cent of foreign material as defined in these standards.

Basis of determination.—All determinations of factors entering into the grading of soybeans shall be made upon the basis of a representative sample drawn in accordance with methods approved by the Chief of the Bureau of Agricultural Economics.

Percentages, except in the case of moisture, shall be percentages ascertained by weight.

Percentage of moisture in soybeans shall be ascertained by the moisture tester and the method of use thereof described in Bulletin No. 1375, issued by the United States Department of Agriculture, or that ascertained by any device and method that give equivalent results.

The test weight per bushel shall be the test weight per Winchester bushel, as determined by the testing apparatus and the method of use thereof described in Bulletin 472, dated October 30, 1916, issued by the United States Department of Agriculture, or as determined by any device and method that give equivalent results.

Damaged Soybeans shall be all soybeans which are distinctly injured by weather, frost, heat, insects, disease, or otherwise.

Split Soybeans, or "Splits," shall be soybeans which are split or broken and which do not pass through the sieve prescribed for the determination of "foreign material" and shall not include soybeans with cracked skins only, or with less than one-fourth of the bean broken off.

Foreign material shall be all matter other than soybeans, and all undeveloped shriveled soybeans and pieces of soybeans which pass through a metal sieve with round hole perforations ten sixty-fourths of an inch in diameter, and all matter other than soybeans that remain on such sieve after screening. All sound whole soybeans which pass through such sieve shall be reclaimed by hand and put back in the sample.

Grade designations.—The grade designations for soybeans shall include successively the letters "U. S.", the name or number of the grade or the words "Sample Grade," and the name of the class, and in the case of "Mixed Soybeans," in addition the name and approximate percentage of each of the classes Yellow Soybeans, Green Soybeans, Brown Soybeans, or Black Soybeans which constitutes 5 per cent or more of the mixture. In lots of "Mixed Soybeans" which contain 5 per cent or more of the Black Eyebrow variety, the percentage of such variety shall be stated in the same manner as that of a class.

CLASSES OF SOYBEANS

Soybeans shall be divided into five classes as follows:

Yellow Soybeans.—This class shall include all yellow soybeans of the Mammoth Yellow, Midwest, Manchur, Ito San, A. K., Hollybrook, Haberlandt, and all other varieties of a similar color and may contain not more than 5 per cent of soybeans of other colors. A slight tinge of green or olive green on the beans shall not affect their classification as Yellow Soybeans.

Green Soybeans.—This class shall include all green colored soybeans of the Morse, Medium Green, or Guelph, and all other varieties of a distinct green color, and may contain not more than 5 per cent of soybeans of other colors and may be slightly yellow tinged.

Brown Soybeans.—This class shall include all light brown and dark brown soybeans of the Virginia, Mammoth Brown, Early Brown, Biloxi, and all other varieties of a solid brown color and may contain not more than 10 per cent of soybeans of other colors.

Black Soybeans.—This class shall include all black soybeans of the Wilson, Peking, Wisconsin Black, Tarheel black, Laredo, and all other varieties of a solid black color and may not contain more than 10 per cent of soybeans of other colors.

Mixed Soybeans.—This class shall include the "Black Eyebrow" variety and any mixtures of soybeans not provided for in classes Yellow Soybeans, Green Soybeans, Brown Soybeans, and Black Soybeans.

**Grade requirements for Yellow Soybeans, Green Soybeans
Brown Soybeans, Black Soybeans, and Mixed Soybeans**

U. S. grade	Condition and general appearance	Minimum test weight per bushel (pounds)	Maximum limits of (per cent)—			
			Moisture	Splits	Damaged beans	Foreign material
Extra No. 1 ¹	Shall be cool and of natural odor, plump, well screened, and of good color.	56	15	0.5	1.0	0.2
No. 1---	Shall be cool and of natural odor and good color.	56	15	1.0	2.0	0.5
No. 2---	Shall be cool and of natural odor and may be slightly stained or mottled.	54	16	10.0	3.0	2.0
No. 3---	Shall be cool and of natural odor and may be stained or mottled.	52	17	20.0	5.0	5.0
No. 4---	Shall be cool and may be badly stained or mottled and may be slightly frosted or immature.	50	18	30.0	8.0	10.0
Sample Grade.	Shall be soybeans which do not comply with the re- quirements of any of the above grades or which have any commercially objectionable foreign odor or are sour, heating, hot, moldy, infested with live weevils or other insects injurious to stored soybeans, or are of otherwise distinctly low quality.					

¹ The grade U. S. Extra No. 1 shall apply only to soybeans of the classes: Yellow Soybeans, Green Soybeans, Brown Soybeans, and Black Soybeans containing not more than 1 per cent of soybeans of other classes, either singly or in any combination, and shall not apply to the class Mixed soybeans, except when such "Mixed Soybeans" are composed of 98 per cent or more of the Black Eyebrow variety.

IMPORTANT FEATURES OF U. S. SOYBEAN STANDARDS

CLASS DESIGNATIONS

In the U. S. Standards for soybeans there are five classes, designated according to color. Each class may be made up of a single variety or of several varieties of the same or a similar color. Variations in size and shape have no bearing on the class designation. For example: the class "Brown Soybeans" may be made up of the Virginia, Biloxi, or any other variety of Brown Soybeans either singly or in any combination. The class "Mixed Soybeans" is made up of a mixture of two or more of the classes Yellow, Green, Brown, or Black Soybeans, and the Black Eyebrow variety, and not a mixture of two or more varieties of the same or a similar color. This classification by colors simplifies the application of the standards and at the same time gives a more accurate basis for evaluating various lots of soybeans, especially for crushing or industrial purposes.

GRADES

Each class of soybeans in the U. S. Standards is divided into the following grades: U. S. Extra No. 1; U. S. No. 1; U. S. No. 2; U. S. No. 3; U. S. No. 4; and U. S. Sample grade, except that mixed soybeans may be graded U. S. Extra No. 1 only when this class is composed of 98 per cent or more of the Black Eyebrow variety. U. S. No. 2 is generally considered the basic grade for the purpose of evaluating soybeans for industrial purposes. U. S. Extra No. 1 and U. S. No. 1 are premium grades, and soybeans which meet the requirements of these grades may be considered high quality commercial seed stocks

from the standpoint of freedom from excessive moisture, splits, damage, and foreign material. The true value of such lots for seed purposes also would depend upon their germination and varietal purity. The grades U. S. Extra No. 1 to U. S. No. 4, inclusive, cover the range of quality normally found in commercial lots of soybeans. Sample grade takes care of any lots which may be of distinctly poor quality or for any reason do not meet the requirements of any of the specific grades.

GRADING FACTORS

The grade of a given lot of soybeans may be affected by one or more of several factors, viz: Condition and general appearance, test weight, moisture, splits, damage, and foreign material. A mixture of colors is not a grading factor and affects only the class designation, except in the case of U. S. Extra No. 1 as shown in the footnote on page 7.

Condition and general appearance.—In grading soybeans, condition is determined by ascertaining whether they are cool, of natural odor, and free from live weevils or other insects injurious to stored soybeans. Any lot of soybeans which does not meet all of these requirements must be graded Sample Grade, except that U. S. No. 4 grade permits a slight foreign odor which is not commercially objectionable and which is not indicative of the soybeans being sour, musty, or otherwise in poor condition.

General appearance applies to the degree of freedom from stained, mottled, and slightly frosted or immature soybeans. Uniformity in size is not essential to good general appearance of any of the grades except U. S. Extra No. 1, which provides that the soybeans "shall be plump and well screened." Definite screen sizes are not fixed for this test, as a knowledge of the size and shape of principal commercial varieties makes this easy of determination by superficial examination.

Test weight per bushel.—The test weight of soybeans usually indicates their degree of plumpness and maturity which reflects their commercial value. The approved method of making this test is described in U. S. Department of Agriculture Bulletin 472.

Moisture.—Moisture is a direct valuation factor as well as a potential condition factor. The maximum moisture content with which soybeans can be stored safely has not been determined definitely. It is known, however, that this depends on storage conditions and the presence of other factors. Based on the best available data, including actual large-scale tests, it appears that soybeans which contain not to exceed 16 per cent moisture and which meet all the other requirements of U. S. No. 2 grade will not go out of condition under normal storage conditions either sacked or in bulk. In grades U. S. Extra No. 1 and U. S. No. 1, moisture is held down to 15 per cent because these are premium grades, 17 per cent is permitted in grade U. S. No. 3, and 18 per cent is permitted in U. S. No. 4. The approved method of determining the percentage of moisture in soybeans is described in U. S. Department of Agriculture Bulletin 1375.

Splits.—Split and broken soybeans do not seriously affect the value of a given lot for industrial purposes; moreover it is difficult, with existing methods of harvesting and threshing soybeans in many sections, to keep the percentage of splits low. For these reasons a rather liberal percentage of this factor is permitted in the basic grade (U. S. No. 2) and correspondingly higher percentages in the lower grades. A split soybean has no value for planting purposes, however, and the higher grades, U. S. Extra No. 1 and U. S. No. 1, which represent in the main high quality seed stocks, contain only five-tenths per cent and 1 per cent, respectively.

Damaged soybeans.—There are several types of damage in soybeans, most of which are due to frost, weather, excessive moisture, and heating

in storage. The type of damage is not so important as the degree to which it affects the commercial value of a lot of soybeans. In the practical application of the U. S. Standards, therefore, all individual soybeans which are distinctly injured by the foregoing or other causes are interpreted as damaged. The correct interpretation of damaged soybeans is difficult to describe and is made positive only by the aid of type samples.



FIG. 1.—Sieve and bottom pan used in the determination of foreign material in soybeans. Sieve should be of metal with round-hole perforations ten sixty-fourths inch in diameter; depth of sieve should be $1\frac{1}{2}$ inches, inside diameter $12\frac{7}{8}$ inches and nest freely with the bottom pan, which should have a depth of $2\frac{1}{2}$ inches

Damage is a more important grade factor than some others because of its greater effect on the quality of soybeans and the products made therefrom. In the U. S. Standards the allowance for this factor is kept down to a minimum. At the same time the range for this factor in the respective grades is sufficiently broad to include the varying degrees of quality of practically all commercial lots of soybeans.

Foreign material.—Most foreign material usually found in soybeans is easily removed with

a small fanning mill on farms or at country elevators, and for this reason the allowances for this factor are relatively low in the U. S. Extra No. 1 and the U. S. No. 1 Grade. Foreign material includes all matter other than soybeans and all sound pieces of soybeans which will pass through a metal sieve with round-hole perforations ten sixty-fourths inch in diameter. (See fig. 1.) Realizing that the prevailing methods of threshing and the absence of cleaning machinery may make it impracticable to clean soybeans to this high standard, more liberal allowances are made for this factor in the lower grades.

APPLICATION OF U. S. SOYBEAN STANDARDS

In the application of the U. S. Standards for soybeans the grade of a given lot may be affected by a single factor or by two or more factors. A lot of Yellow Soybeans, for example, may meet the requirements of the U. S. No. 2 grade as to condition, general appearance, and test weight, and be within the limits of splits, damage, and foreign material for this grade and yet it may grade U. S. No. 3 on account of containing over 16 per cent moisture. Another lot may meet the requirements of U. S. No. 1 except for excess splits, which would throw it into a lower grade. In general practice, however, two or more factors usually operate to determine the grade.

In making inspections, if the grade is below U. S. No. 1, the factor or factors determining the grade are always stated on the certificate of grade issued, as: U. S. No. 2 Yellow Soybeans (account of 8.5 per cent splits); U. S. No. 3 Brown Soybeans (account of 17 per cent moisture and 4.5 per cent damage). The complete detailed analysis or any portion thereof may also be stated if requested by the applicant.

FEDERAL SOYBEAN INSPECTION SERVICE

Federal soybean inspection is authorized by a clause in the annual appropriation act for the Department of Agriculture. The general plan for conducting this service provides for the employment of Federal soybean inspectors at shipping points and at important terminal markets under cooperative agreements between the Bureau of Agricultural Economics and organizations such as State departments of agriculture, commercial exchanges, and dealers' or growers' associations. Under these agreements, persons who possess the necessary qualifications are trained and licensed as Federal soybean inspectors and their work is supervised by the bureau during the life of the license. The organization cooperating with the bureau pays the inspector for his work and pays all local expenses (such as office rent) necessary to the proper conduct of the work. The organization cooperating with the bureau usually collects the fees charged for inspections made under agreements of this kind. The funds obtained in this way are divided between the local organization and the United States Department of Agriculture in such a manner that both are recompensed as nearly as possible for the expense incurred by them in the conduct of the service.

The work of the local inspector is supervised by soybean standardization specialists of the United States Department of Agriculture and by supervising inspectors. The supervising inspectors not only assist in supervising the work of the local inspectors but also are available for the purpose of making inspections at points in their territory where no other inspectors can be obtained, and of assisting producers, shippers, and consumers in obtaining all benefit possible from the U. S. Standards for soybeans and the Federal soybean-inspection service.

If there is sufficient demand for inspection at any place to pay the expense of having an inspector, but no available organization is prepared

to cooperate with the bureau in employing an inspector, the bureau may locate an inspector at that point who is a full-time Government employee, or may arrange to furnish the service in any other way that may appear desirable. Inspectors located at any shipping point or terminal market usually are available for making inspections at neighboring points.

Persons interested in having a Federal soybean inspector located at any point should write the Bureau of Agricultural Economics, United States Department of Agriculture, Washington, D. C. Communications of this nature should outline as fully as possible the situation at the point where inspection is desired, including the name of any State or local organization with whom the bureau might cooperate in establishing the service, and the probable number of inspections which would be made annually.

Federal-State inspection.—Where the service is established in cooperation with a State agency, such as a State department of agriculture, the inspectors usually are Federal-State inspectors. Certificates issued by such inspectors are Federal-State certificates and are supported by the authority of the State as well as the Federal Government. In most cases these certificates are prima facie evidence of the facts contained in State courts as well as in Federal courts.

Qualifications of inspectors.—An applicant for a license as a Federal soybean inspector is required to show that he has had sufficient experience in grading and marketing soybeans or other commodities of a similar nature to enable him to grasp readily the application of the United States standards. A Federal inspector may not have a financial interest, either directly or indirectly, in a business engaged in handling soybeans. Before being granted a license, the applicant's personal knowledge and experience is supplemented by the necessary training given by the Bureau of Agricultural Economics to insure accurate and consistent interpretation and application of the standards. This training

consists largely of drills in the technique of inspection, in the identification of the classes of soybeans, in the interpretation of grade factors, and in the construction of the United States standards. After receiving a Federal license, an inspector is required to send in to the Washington office, or to the supervising inspector's office in his district, portions of samples used as the basis for making the inspections, properly identified. This gives an effective check on the work of the individual inspector and promotes uniform and consistent application of the standards by all inspectors.

Federal soybean inspection certificates.—Regulations of the Secretary of Agriculture governing the inspection of soybeans require an inspector to issue an inspection certificate for each lot of soybeans inspected in practically every case. The inspection certificate thus issued is evidence of the quality of the soybeans covered thereby, expressed in terms of the United States standards. The law provides that all such certificates are receivable in all courts of the United States as *prima facie* evidence of the truth of the statements they contain. Several of the States also have similar laws making these certificates acceptable as *prima facie* evidence in their State courts.

All inspection certificates show the date on which the inspection was made and the quantity of soybeans in the lot inspected, together with the identification and location of the soybeans at the time of inspection. Following these items are given the grade and class of the beans in the lot in terms of the United States standards. Notations regarding factors affecting the grade may follow the grade and class as already explained on page 12. If there are more than one grade and class of soybeans in the lot and these are separated, the approximate amount and grade and class of each portion is stated separately on the certificate, the largest quantity being named first. Statements regarding poor sacking, defects in cars in which the soybeans are loaded,

and other similar information, are placed below the grade and class.

Methods of inspection.—Inspections may be made either at original shipping points, in transit, or at terminal markets. Inspections are made on the basis of a representative sample drawn from the lot in accordance with methods prescribed by the Chief of the Bureau of Agricultural Economics. Such samples must be drawn either by the Federal inspector who makes the inspection or by some other person officially designated by the bureau, or by the cooperating organization, and approved by the bureau for this purpose. Certificates of grade issued in such cases cover the entire lot of soybeans represented by the sample.

If a lot of soybeans is located too far from an inspector's office to allow an official sample to be drawn, a sample of 2 pounds or more may be taken by anyone interested and submitted to the nearest inspector or to the Washington office for inspection. Such sample should be drawn in strict accordance with methods approved by the chief of the bureau as presented below. If moisture is suspected of being a grade-determining factor, a portion of the sample (see p. 17) should be placed in a moisture-proof container, in order that the resulting grade of the sample may represent more closely the true grade of the lot at the time the sample was taken. This is termed "sample inspection" and certificates of grade issued show the size of the sample submitted and state that the quality and condition is that of the sample only. The value of a certificate of this kind depends largely upon whether the sample is truly representative of the lot from which it was taken. In case a controversy is to be settled, parties should agree upon a representative sample for this purpose before sending it to an inspector.

Method of sampling.—The obtaining of a representative sample is essential to the determination of the true grade of a given lot of soybeans. If the sample obtained is not representative, no

amount of care in analyzing the sample will show the correct grade of the soybeans being inspected. To the end that a sample may be representative of the soybeans in the lot from which it is drawn the following method of sampling is prescribed for inspectors licensed to inspect soybeans under the United States standards:

The sample drawn should be approximately 2 quarts or larger in size. If the time to elapse between the drawing of the sample and the determination of the grade would allow a change in the condition of the sample (such as loss of or accumulation of moisture) such as would affect the grade, at least $1\frac{1}{8}$ pints should be drawn separately and placed in an air-tight container.

If the soybeans are in bags, samples should be drawn from at least 10 per cent of the individual bags, selected at random in a lot, and from as many more as, in the opinion of the inspector, may be necessary to obtain an average and representative sample.

In case of bulk soybeans, at least five probes with a double-shell compartment trier 60 inches long (see p. 18), and as many more as may be necessary, in the discretion of the inspector, shall be taken from different parts of the lot to be inspected.

Samples drawn from different portions of a lot of soybeans should be observed and if it appears that a material portion of the lot is in any way distinctly inferior to the remainder of the lot, a separate sample should be drawn from each portion. The estimated amount in each portion should be ascertained and such portions treated as separate lots.

Soybean triers (probes).—For use in obtaining a representative sample from a lot of soybeans the triers (probes) shown in Figure 2 are recommended. The trier shown in Figure 2 C is satisfactory for bagged soybeans. In using this type of trier the inspector or sampler should probe alternately the top and bottom of the bags.

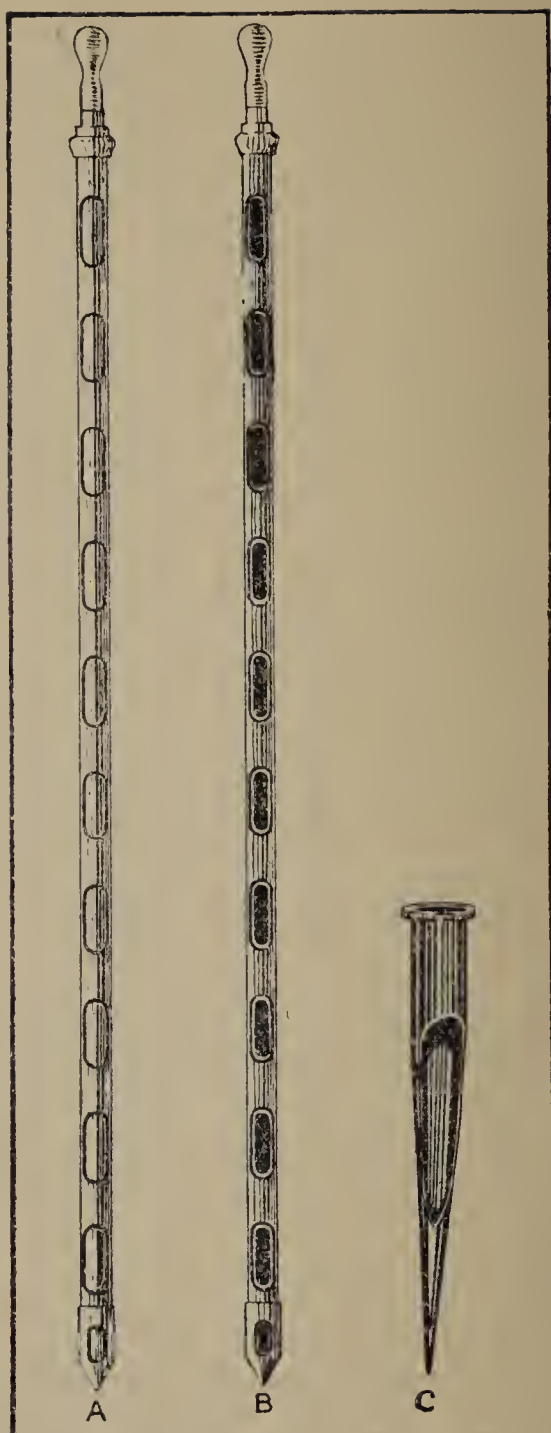


FIG. 2.—Soybean triers (probes). A and B, Double-tubed, separate-compartment trier (probe), 60 inches long, recommended for sampling a carload or smaller lot of soybeans in bulk. A, Trier closed; B, trier open. C, Short, needle-point trier 9 inches long for sampling soybeans in bags.

For bulk soybeans the long double-tube separate-compartment trier (probe) shown in Figure 2, A and B, is strongly recommended. The use of such a trier makes it possible for the sampler to note any unevenness in the quality of soybeans in different portions of the lot and to ascertain the approximate location and quantity of any distinctly low-quality soybeans in the lot.

Appeal inspection.—An appeal from an original inspection may be taken at any time if the quality or condition of the soybeans has not undergone a material change since the original inspection, if the identity of the lot has been preserved, if the reasons for the appeal are not irrelevant or unsubstantial, and if the regulations of the Secretary of Agriculture have been complied with otherwise. An appeal inspection is never made by the inspector who made the original inspection from which the appeal was taken, but is made by an inspector designated specifically for that purpose by the Chief of the Bureau of Agricultural Economics. The result of this arrangement is that in practically every appeal the determination of all factors which affect the grade of the soybeans is made by a Federal supervising inspector. An appeal inspection certificate gives a clear statement of the quality and condition of the soybeans in the lot and specifically refers to all previous certificates superseded by it. When an appeal inspection can not be obtained because of a change in quality or condition of the soybeans involved, an additional inspection may be had to determine the effect of such changes. An additional inspection also may be obtained at any time for the purpose of providing an up-to-date certificate.

Who receives certificates.—The original of any form of Federal soybean-inspection certificate is always delivered to the person who makes application for the inspection. Not more than three copies may be issued to the applicant without extra charge. Additional copies may

be obtained by the applicant or other financially interested parties upon the payment of a small fee. The inspector who makes the inspection retains a copy for his files and sends one or more copies as may be requested to the supervising inspector in his district or to the Washington office as directed. Copies of appeal inspection certificates are sent to all interested parties, if known, except the carriers, and to such carriers as have been applicants for previous inspections.

Fees and charges.—The Secretary of Agriculture authorizes certain fees and charges to be collected for the work of Federal inspectors. These vary somewhat at different points, depending upon the volume of business at the point involved, the accessibility of localities where inspections ordinarily are made, and other factors. The fees are the amounts charged for the actual work of making the inspections and appeal inspections and the charges cover amounts which inspectors are permitted to charge for their time, travel, and other necessary expenses when making inspections at points away from their regular stations.

How to obtain inspection.—Any person who has a financial interest in a lot of soybeans and who desires to obtain inspection of the lot should make application for inspection to any Federal soybean inspector. If there is no local inspector or if the location of an inspector is not known, application should be made direct to the United States Bureau of Agriculture Economics, Washington, D. C. Applications made in this way will be referred to the nearest inspector in the field for attention or will be handled direct by the Washington office. Anyone who wishes inspection of all soybeans which are shipped or received by him should file an application to that effect in a similar manner.



